FACTORS INFLUENCING THE INVOLVEMENT OF WOMEN IN TECHNOLOGY PROGRAMMES IN NIGERIAN UNIVERSITIES (CASE STUDY FEDERAL OF TECHNOLOGY, OWERRI, IMO STATE, NIGERIA

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ABSTRACT

In September 25 2015, countries of the world adopted what is now called sustainable development goals (SDG). Each goal has specific targets to be achieved over the next fifteen (15) years. The focus of this paper is on goal five which is targeted at Gender Equity and Women Empowerment. Various factors responsible for gender inequality in Information Technology were investigated in this paper such as poor IT career counselling, technophobia, poor motivation and lack of female mentors, stereotype, competition, female marginalization and bias. A sample size of 245 was derived from the population size of 631 (the number of students in the department of Electrical/Electronic Engineering, Computer Science and Information Management Technology) Likert-5 point structured questionnaire was randomly distributed among these 245 female students in the three departments to ascertain factors affecting female involvement in Information Technology. The response was analysed using analysis of variance (ANOVA) and t-test. It was observed that Technophobia and poor motivation as well as bias and marginalization are the major factors affecting the involvement of women in Information Technology. It was also found out that though the percentage of female admitted to study these courses was very low, yet the percentage of passes was higher for females than males as can be seen in the result of 2014/2015 session used for investigation. It is recommended that for Nigeria to meet the sustainable development goal 5, concerted efforts must be made to include more women and girls in Science and Technology Engineering and Management (STEM) courses.

Keywords: Women Participation, Sustainable Development Goal, Information Technology, Science and Technology, Management
Background of Study

One of the most potent forces shaping the 21st century is the new Information and Communication Technologies. Their revolutionary impact affects the way we live, learn, work, and spend our leisure time, and communicate as Information Technology involves anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies. Information Technology is becoming a vital engine of growth for the world economy. They have the potential to enable many enterprising individuals, firms, communities, in all parts of the planet, to address economic and social challenges with greater efficiency and imagination (Nwakanma et al, 2015, Natasha, 2003).

While ICTs and the Internet offer vast, new and unprecedented opportunities for human development and empowerment in areas ranging from education and the environment to healthcare and business, they are also one of the key contributing factors to social and economic disparities across different social and economic groups. The gender divide is one of the most significant inequalities to be amplified by the digital revolution, and cuts across all social and income groups. Throughout the world, women face serious challenges that are not only economic but social as well as cultural – obstacles that limit or prevent their access to, use of, and benefits from the booming Information Technology sector (Nwakanma et al, 2015).

Meeting the sustainable development goal will demand that women are meant to explore and benefit from the dividends of digital revolution. One way to achieve this is by making the profession an all-inclusive one in terms of gender balance. The involvement and engagement of women in the Information Technology field on an equal footing with men will directly contribute to improving the livelihood of people, making it more sustainable and thereby promoting the social and economic advancement of societies.

Women represent the main economic force in most developing countries. As economies become more and more information-driven, the issues of women’s access to and use of ICTs is growing in importance for both developed and developing economies. The ease with which information and communication technologies can transmit and disseminate information for development is well recognized. But the access of women to ICTs cannot be assumed to occur “naturally” when gender-blind approaches and technologies are implemented. As a result of profound, gendered applications and implications of ICTs in employment, education, training and other areas of life, women need encouragement and support to take their rightful place in the information revolution (Nwakanma et al, 2015).

Women are underrepresented in all decision-making structures in the ICT sector, and this undermines the negotiation of gender-sensitive investment decisions and introduction of innovative patterns, policies and standards in the ICT sector. Equitable access to ICTs and the autonomy to receive and produce information relevant to women’s needs and concerns are
central to women’s empowerment, and to the construction of an Information Society for all (Kevin, 2013, Nwakanma et al, 2015).

**Statement of Problem**

We have heard it a million times: Men outnumber women in Science, Technology, Engineering, and Math (STEM) fields. It is not new to note that that the percentage of female participation in the field of Information Technology and other related computing fields is little as when compared to that of the male population (Nwakanma et al, 2015). According to the National Math and Science Initiative (NMSI), just 23% of workers in STEM-related jobs are women (Kevin, 2013). There are many reasons why women seldom venture into computing fields, including everything from not getting enough positive reinforcement, to other things like the nature of the field and even stereotype threat. The stereotype that men are better in certain fields than women is so ingrained in our culture that women feel stereotype threat — and as a result may not want to venture into such field as they are afraid of performing poorly. There is therefore a need to motivate women to realize the equal capabilities they possess to excel in the field of Information Technology.

**Objective of Study**

The broad objective of this study is to evaluate factors impeding the achievement of gender equity and equality in Information Technology.

However, the specific objectives are:

I. Identification of common factors impeding the achievement of gender equity and equality in Information Technology.

II. Determining the collective effects of these factors on the achievement of gender equity and equality in Information Technology.

III. Assessing the individual effects of these factors on the achievement of gender equity and equality in Information Technology.

IV. Making recommendations based on findings of this study where possible.

**Scope of Study**

In order to effectively carry out this research and curtain distance challenges, departments to be selected and use as case studies will be within Federal university of Technology Owerri (FUTO).

**Significance of Study**

This work was motivated by the urgent need to proffer solutions to the gender gap which has been observed in Information Technology and other computing related courses in various universities. It has been observed that females tend to show little interest in taking up career opportunities in Information Technology related courses. A look at the population of male and
female students in Information Technology, Computer Science and other related fields in various Universities show that the male population twice or even more outnumbers that of the females (Awah, 2015). This work is aimed at stimulating discuss in this area. This research is therefore relevant as the field of Information Technology continues to experience rapid boom, incorporating even less tedious areas of specialization like cloud computing.

The result of this research will therefore go a very long way in challenging Admission units of every University in Nigeria to encourage gender equity and equality during admission process by ensuring that the admission process is free of gender bias. The academic planning units and the guidance and counseling units of secondary schools will also find this work beneficial as it will challenge them to appreciate the need to incorporate Information Technology courses in their curriculum and the need to also expose students especially the females to possible career opportunities in Information Technology.

Government regulatory agencies like (NCC, CPN etc), will benefit from this work and thus serve as an eye opener to the need of enacting policies that ensure gender equity and equality. This will encourage the female folks to take up career in Information Technology and other Computing related fields.

Interest groups in Information Technology (like Nigerian Women in Information Technology, NIWIIT, and Gender Studies Association of Nigeria –GSAN etc) will benefit from this research as this will suggest better ways of achieving the Association’s objective.

**LITERATURE REVIEW**

Udry, (1994) defined Gender as the range of characteristics pertaining to, and differentiating between masculinity and femininity. Depending on the context, these characteristics may include biological sex (i.e. the state of being male or female or intersex), sex-based social structures (including gender roles and other social roles), or gender identity. The term gender can also refer to economic, social and cultural attributes and opportunities associated with being male and female. In most societies, being a man or woman is not simply a matter of different biological and physical characteristics. Men and women face different expectations about how they should dress, behave or work. Relations between men and women, whether in the family, workplace or the public sphere, also reflect understandings of the talents, characteristics and behavior appropriate to women and men. Gender thus differs from sex in that it is social and cultural in nature rather than biological. Gender attributes and characteristics, encompassing, inter alia, the roles that men and women play and the expectations placed upon them, vary widely among societies and change over time. But the fact that gender attributes are socially constructed means that they are also amenable to change in ways that can make a society more just and equitable. Gender is a concept that refers to the social differences between women and men that have been learned are changeable over time and have wide variations both within and between cultures.’’ Gender refers to the rules, norms and practices by which the biological differences between men
and women, boys and girls, are interpreted so as to result in unequal assessments, possibilities and opportunities in life (Brigitte et al, 2006). The Oxford Advanced Learner’s Dictionary defined the term gender as ‘the fact of being male or female (typically used with reference to social and cultural differences, rather than biological ones)’.

Gender equity is the process of being fair to men and women. To ensure fairness, strategies, policies and measures must often be available to compensate for men’s historical and social disadvantages that prevent women and men from otherwise operating on a level playing field. Equity leads to equality (Nwakanma et al, 2015). The goal of gender equity, sometimes called substantive equality, moves beyond equality of opportunity by requiring transformative change. It recognizes that men and women have different needs, preferences, and interests and that equality of outcomes may necessitate different treatment of men and women. An equity approach implies that all development policies and interventions need to be scrutinized for their impact on gender relations. It necessitates a rethinking of policies and programs to take account of men’s and women’s different realities and interests. Gender equity denotes the equivalence in life outcomes for Women and Men, recognizing their different needs and interests and requiring a redistribution of power and resources (Hazel and Sally, 2000).

Gender equality in the context of this paper, does not imply that women and men are the same, but that they have equal value and should be accorded equal treatment. Gender equality seeks human dignity for women and men, recognizing that gender roles and identities are flexible and influenced, among other things, by social status and ethnicity. It could also be defined as the concept that all human beings are free to develop their personal abilities and make choices without the limitations set by strict gender roles; that the different aspirations and needs of women and men are considered, valued and favored equally (Brigitte et al, 2006). The United Nations Fund for Population Activities requires that for there to be gender equality, there must be equal enjoyment by women and men of socially-valued goods, opportunities, resources and rewards (United Nation Systems in Nigeria, 2013). Where gender inequality exists, it is generally women who are excluded or disadvantaged in relation to decision-making and access to economic and social resources. Gender equality does not mean that men and women become the same; only that access to life opportunities and changes is neither dependent on, nor constrained by, their sex (Brigitte et al, 2006).

However, for equality to be achieved, we need a definition that recognizes that women and men start from different positions of advantage, and are constrained in different ways. Thus achievement of substantive equality requires the recognition of ‘the ways in which women are different from men, in terms of their biological capacities and in terms of the socially constructed disadvantages women face relative to men’ (Kabeer, 1999).

Therefore, a critical aspect of promoting gender equality is the empowerment of women, with a focus on identifying and redressing power imbalances and giving women more power to manage their own lives. Achieving gender equality requires women’s empowerment to ensure that
decision-making at the private and public levels and access to resources is no longer weighted in men’s favor, so that both men and women can fully participate as equal partners in productive life (Edwina, 2005).

Information Technology can be defined as the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data (Daintith et al, 2009). Information Technology has been defined in a business context by the Information Technology association of America as the “the study, design, development, application, implementation, support or management of computer based information systems” (Proctor, 2011). In an academic context, the Association for Computing Machinery defined IT as “Undergraduate degree programs that prepare students to meet the computer technology needs of business, government, healthcare, schools and other kinds of organization. IT specialists assume responsibility for selecting hardware and software products appropriate for an organization, integrating those products with organizational needs and infrastructure, and installing, customizing, and maintaining those applications for the organization’s computer users” (The Joint Task Force for Computing Curricula, 2005).

Information and Communication Technologies (ICT) comprise a complex and heterogeneous set of goods, applications and services used to produce, process, distribute and transform information. The ICT sector consists of segments as diverse as telecommunications, television and Radio Broadcasting, computer hardware, software and services and Electronic Media (Edwina, 2005). The term ICT has been used to encompass technological innovation and convergence in information and communication leading to the development of so-called information or knowledge societies, with resulting changes in social interaction, economic and business practices, political engagement, education, health, leisure and entertainment (Concepcion and Pi, 2001). Over the past decade, there has been a growing understanding that these technologies can be powerful instruments for advancing economic and social development through the creation of new types of economic activity, employment opportunities, improvements in health-care delivery and other services, and the enhancement of networking, and advocacy within society. ICT also have the potential to improve interaction between Governments and citizens, fostering transparency and accountability in governance (Edwina, 2005).

While the potential of ICT for stimulating economic growth, socioeconomic development and effective governance is well recognized, the benefits of ICT have been unevenly distributed within and between both genders. Edwina 2005 opined that while there is recognition of the potential of ICT as a tool for the promotion of gender equality and the empowerment of women, a “gender divide” has also been identified, reflected in the lower numbers of women accessing and using ICT compared with men. Unless this gender divide is specifically addressed, there is a risk that ICT may exacerbate existing inequalities between women and men and create new forms of inequality. If, however, the gender dimensions of ICT—in terms of access and use, capacity-building opportunities, employment and potential for empowerment—are explicitly
identified and addressed, ICT can be a powerful catalyst for political and social empowerment of women, and the promotion of gender equality.

**Growth Trend in Female Education**

In terms of educational attainment in Nigeria, women tend to lag behind than the men. The 2000 population census records the illiteracy rate among men at 6.1%, while that of women at 19.4% (SIS, 2003). Among the illiterate population, men’s average level of schooling far exceeds that of women though there seems to be a faster improvement among the latter (Dayıoğlu and Tunali, 2002). Gender disparity in schooling is also observed among the younger population where female school enrollment in basic and secondary education falls behind male children (Tansel, 2002; Ertürk and Dayıoğlu, 2004). Unfortunately, gender imbalance is also noticeable in enrolment in different disciplines and programs, especially at the tertiary level (Nwajiuba, 2011). Citing National Gender Policy, (2006), Nwajiuba, (2011) stated that “evidences abound that several negative aspects of gender relations such as gender-based divisions of labor, disparities between males’ and females’ access to power and resources, gender biases in rights and entitlements remain pervasive in Nigeria”. Gender imbalances in student’s university enrolment has been attributed to many factors like traditional and cultural norms, attitudes and prejudices, religion, poverty and ignorance (Nnaka, 2010).

Much attention and emphasis has been given to gender enrolment status in the primary, secondary and tertiary education levels in Nigeria which has necessitated a lot of interventions by different bodies and associations. Gender equitable access to higher education must be an integral part of any strategy to promote long term development in the universities and other institutions of higher learning in Nigeria (Onokala and Onwurah, 2001).

The turnout of graduates in Nigerian Universities, according to NUC’s report on university annual review, showed that from 2001-2005, males who obtained master’s degree were 44,337 (72.79%) while females were 16,567 (27.20%). For undergraduates with doctoral degrees for the same period, males were 2,587 (64.01%) and females were 798 (23.57%). There was also low evidence of female enrolment in sciences and technology related courses (Agu and Omenyi, 2013). Gender parity in universities is a very vital and significant issue because the key to every nation’s social, political and economic growth and development lies in the optimal participation of the citizenry in nation building. If basic education of women has produced unequalled socio-economic benefits at the family and community levels, the university education will enable a nation to leap forth in social, political and economic growth (Bunyi, 2004).

It is a very clear fact that the overall population of male students who secure admission in various tertiary institutions more than twice outnumbers that the females. To throw more light to this existing difference in population of male and female, let’s take a look at the summary of admission data of the Federal University of Technology Owerri (FUTO) for 2014/2015 academic session, where the overall population of males who secured admission in the university for the session is 3,829 as compared with 1,125 females (FUTO, 2015).The details are summarized in
the 2015 FUTO matriculation brochure and Nwakanma et al (2015). Placing special emphasis on the three case studies, the male versus female ratio in the following technology related courses (IMT, CSC, and EEE) offered in FUTO.

The information above can be summarized in table 1 below:

Table 1: Summary of Male versus Female Students Percentage

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>MALE PERCENTAGE</th>
<th>FEMALE PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMT</td>
<td>79.4%</td>
<td>20.6%</td>
</tr>
<tr>
<td>CSC</td>
<td>81.7%</td>
<td>18.3%</td>
</tr>
<tr>
<td>EEE</td>
<td>91.5%</td>
<td>8.5%</td>
</tr>
</tbody>
</table>

Analysis of the Performance of Female Students

According to Saunders and Woodfield, (1999), women achieve better results in their degrees than the male gender because the females attend more timetabled sessions, submit more work that is not formally accessed (which does not directly count towards their final degree mark), and are, generally speaking, more willing to conform with institutional requirements. In the department of Information Management Technology, Federal University of Technology Owerri (FUTO), it has been observed that over the years the female gender tends to perform better than their male counterparts on the average. Examining sex-related differences in classroom grades, we found out that in contrast to standardized measures of Engineering courses, female students outperform males in engineering classes. Females tend to work more conscientiously and have a stronger work ethics than males. Females also tend to have better language abilities including essay writing skills, vocabulary and word fluency which contributes to better course work. In higher education women are often found to outperform men. This has been observed to be the case irrespective of the measure of success used. Sex remains a significant predictor of CGPA after controlling for various individual attributes such as ethnic background. Females have better study skill than the male students. Some researchers have argued that women make higher grades than men because they work harder and attend classes more frequently (Dayıoğlu and Türüt-Aşık, 2004). However, it has also been observed that females tend to underrate their academic performance ability when it comes to engineering and technological related courses. Angela Bielefeldt in Jenny, (2012) stated that while female engineering majors grade just as well as men, they have a tendency to underrate their technical abilities. She further stated that “Women tend to leave engineering with higher grade point averages than the men… but they perceive that their technical skills are sometimes different. And they’re not different, in reality.” (Jenny, 2012). The lead researcher carried out a research on the performance of the students of department of Information Management Technology, Federal University of Technology Owerri from 2013 to 2017 and it was observed that amongst the top ten students in a class of 170, female
students were 7 as against 3 males. It was also observed that the top five were all female (Nwakanma, 2017)

Factors Affecting Achievement of Gender Equity and Equality in Information Technology

The study work took the form of a survey research which involved the explanatory type. A major characteristic of all survey research designs is lack of control. The researcher is interested in observing what is happening to sample subjects or variables without any attempt to manipulate or control them.

Sources of Data

Primary and secondary data were employed to accomplish this work. The primary data was generated from administered questionnaires to the three technological related departments in FUTO namely IMT, CSC, EEE while secondary data was gotten from FUTO matriculation Brochure, journals, texts, electronic sites and other materials relevant to the topic.

Method of Data Collection

In the process of collecting data for this research work, Questionnaires were generated and administered to retrieve information from the population under study.

Population of Study

The initial work of a researcher is to define his study population explicitly. The population of a study is a census of all items or subjects that possess the characteristics or that has knowledge of the phenomenon being studied (Nworuh, 2004). This is the theoretical specified, aggregation of survey elements. The elements in this sense refer to individuals, materials and institutions about which the researcher collects information for his analysis.

In knowing the real sample size to use in the study, the researcher used Yaro-yamen formula. This method is adopted when one is having finite Population, which can be utilized in computing the sample size.

Thus, \( n = N/1 + N(e)^2 \) ……………equation (3.1)

Where, \( n \) = sample size

\( N = \) Population of the study

\( e = \) sample error/ tolerance error level

\( 1 = \) the constant (Nworuh, 2001)

The sample error for this study has been chosen to be 5% (0.05).
So, $N = 631$

$n =$?

Applying the formula we have:

$$n = \frac{631}{1 + 631(0.05)^2}$$

$$n = \frac{631}{1 + 631(0.0025)}$$

$$n = \frac{631}{2.5775}$$

$$n = 244.81 \approx 245$$

The sample size is 245 therefore 245 questionnaires were printed.

**ANALYSIS OF RESULTS AND DISCUSSION**

Descriptive Analysis of Characteristics of Respondents

**Sex**

Table 4.1 showing the sex of respondents

<table>
<thead>
<tr>
<th>SEX</th>
<th>RESPONSES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>135</td>
<td>64 %</td>
</tr>
<tr>
<td>Female</td>
<td>75</td>
<td>36 %</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Source: Researcher’s Questionnaire 2015.

Table 4.1 shows the sex of respondents. Male respondents were 135 in number representing 64% of the population while females were 75 in number representing 36%. Therefore, majority of the respondents are male. This reaffirms our earlier position on male dominance of the Information and Technology profession.

**Age Group**

Table 4.2 showing the age group of respondents

The survey showed that the age brackets of university students from 100 level to 500 level were as follows:

<table>
<thead>
<tr>
<th>AGE GROUP</th>
<th>RESPONSES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-21 years</td>
<td>69</td>
<td>33 %</td>
</tr>
<tr>
<td>22-25 years</td>
<td>121</td>
<td>58 %</td>
</tr>
<tr>
<td>25-above</td>
<td>20</td>
<td>9 %</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Researcher’s Questionnaire 2015.
Table 4.2 shows the age group of the respondents. Those between ages 18-21 years were 69 in number representing 32%, those between 22-25 years were 121 in number representing 58% while those above 25 years were 20 in number representing 9%. Basing on the results obtained, the researcher found that the majority of the respondents, 58% of the respondents were between the ages of 22-25 years.

**State of Origin**

**Table 4.3 showing the State of Origin of respondents**

<table>
<thead>
<tr>
<th>STATE</th>
<th>RESPONSES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imo</td>
<td>101</td>
<td>48%</td>
</tr>
<tr>
<td>Abia</td>
<td>20</td>
<td>10%</td>
</tr>
<tr>
<td>Anambra</td>
<td>43</td>
<td>20%</td>
</tr>
<tr>
<td>Ebonyi</td>
<td>11</td>
<td>5%</td>
</tr>
<tr>
<td>Enugu</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>Delta</td>
<td>8</td>
<td>4%</td>
</tr>
<tr>
<td>Edo</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Rivers</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Lagos</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>AkwaIbom</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>210</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Researcher’s Questionnaire 2015.

Table 4.3 shows the state of origin of the respondents. 101 of the respondents were from Imo state representing 48%, 20 of the respondents were from Abia state representing 10%, 43 of the respondents were from Anambra state representing 20%, 11 of the respondents were from Ebonyi state representing 5%, 14 of the respondents were from Enugu state representing 7%.8 of the respondents were from Delta state representing 4%, 3 of the respondents were from Edo state representing 1%, 3 of the respondents were from Rivers state representing 1%, 3 of the respondents were from Lagos state representing 1%, 4 of the respondents were from AkwaIbom state representing 2%. Table 4.3 shows that majority of the respondents were from Imo state. This is understandable considering the admission policy in the country that places emphasis on catchment area amongst other requirements.

**Nationality**

**Table 4.4 showing the Nationality of respondents**

<table>
<thead>
<tr>
<th>NATIONALITY</th>
<th>RESPONSES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigerian</td>
<td>210</td>
<td>100%</td>
</tr>
<tr>
<td>Others</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>210</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Source: Researcher’s Questionnaire 2015.

Table 4.4 shows the Nationality of respondents. All the 210 respondents indicated their Nationality as Nigeria representing 100%.

4.1.5 Department

Table 4.5 showing the department of respondents

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>RESPONSES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information management technology (IMT)</td>
<td>161</td>
<td>77%</td>
</tr>
<tr>
<td>Electrical Electronics Engineering (EEE)</td>
<td>36</td>
<td>17%</td>
</tr>
<tr>
<td>Computer Science (CSC)</td>
<td>13</td>
<td>6%</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Researcher’s Questionnaire 2015.

Table 4.5: shows the department of the various respondents. 161 respondents indicated their department as Information management technology (IMT) representing 77% of the population, 36 of the respondents indicated their department as Electrical Electronics Engineering (EEE) representing 17% of the population, 13 of the respondents indicated their department as Computer Science (CSC) representing 16% of the population.

4.1.6 Faculty

Table 4.6 showing the faculty of respondents

<table>
<thead>
<tr>
<th>FACULTY</th>
<th>RESPONSES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMAT</td>
<td>161</td>
<td>77%</td>
</tr>
<tr>
<td>SEET</td>
<td>36</td>
<td>17%</td>
</tr>
<tr>
<td>SOSC</td>
<td>13</td>
<td>6%</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Researcher’s Questionnaire 2015.

Table 4.6: shows the faculty of the various respondents. 161 respondents indicated their faculty as School of Management Technology (SMAT) representing 77% of the population, 36 of the respondents indicated their faculty as School of Engineering and Engineering Technology
(SEET) representing 17% of the population, 13 of the respondents indicated their faculty as School of Science (SOSC) representing 16% of the population.

4.1.7 Level

Table 4.7 showing the level of respondents

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>RESPONSES</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 level</td>
<td>28</td>
<td>13%</td>
</tr>
<tr>
<td>200 level</td>
<td>15</td>
<td>7%</td>
</tr>
<tr>
<td>300 level</td>
<td>23</td>
<td>11%</td>
</tr>
<tr>
<td>400 level</td>
<td>80</td>
<td>38%</td>
</tr>
<tr>
<td>500 level</td>
<td>64</td>
<td>31%</td>
</tr>
<tr>
<td>Total</td>
<td>210</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Researcher’s Questionnaire 2015.

Table 4.7: shows the various levels of the respondents. Respondents in 100 level were 28 in number representing 13% of the population, respondents in 200 level were 15 in number representing 7%, respondents in 300 level were 23 in number representing 11% of the population, respondents in 400 level were 80 in number representing 38%, the respondents that were in 500 level were 28 in number representing 31% of the population. Table 4.7 shows that majority of the respondents were in 400 level.
Correlation analysis is a technique used in measuring the closeness of the relationship between variables or among variables. It helps in ranking the variables based on their level of correlation. From table 4.8, it could be observed that the variables are ranked from highest to lowest. That is Y, X₁, X₂, X₃, X₄, and X₅. The table also showed that there is a correlation between Y and X₁ of 0.068, Y and X₂ of 0.420, Y and X₃ of 0.470, Y and X₄ of 0.383, Y and X₅ of 0.424. It can also be observed that among the independent variables the correlation of X₁ is the least with a correlation of 0.068. The highest is X₄ with a correlation of 0.383. This means that there is correlation between all the variables indicated in the table 4.8 and all the variables are significant even though X₁ showed weak correlation.
Model Summary

The model summary from statistical package for social sciences (SPSS) output is shown below.

Table 4.9 Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.600</td>
<td>.360</td>
<td>.344</td>
<td>2.72044</td>
<td>22.953</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

Source: Researcher’s computation (SPSS version 17)

It can be deduced from table 4.9 that the $R^2$ is 0.360 meaning that 36% of the factors affecting the achievement of gender equity and equality in Information Technology can be accounted for in our model. Also our model is very reliable since $F$ change is 0.000 as can be seen in the table 4.9 above. The unaccounted factors not covered in this project are 74%. Further research into identifying more factors that affect the achievement of gender equity and equality in Information Technology can improve the value of $R^2$.

F-Test (ANOVA)

The analysis of variance (ANOVA) table is shown below:

Table 4.10 ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Degree of freedom</th>
<th>Mean Square</th>
<th>F</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>849.361</td>
<td>5</td>
<td>169.872</td>
<td>22.953</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>1509.763</td>
<td>204</td>
<td>7.401</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2359.124</td>
<td>209</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Researcher’s computation (SPSS version 17)
Table 4.10 presents the ANOVA report on the general significance of the model. As F – significant of 0.00 is less than 0.05 level of significant, the model is significant. Thus, the combination of the independent variables $X_1$, $X_2$, $X_3$, $X_4$ and $X_5$ significantly predicts the dependent variable $Y$. These thus lead to rejecting $H_{01}$ and accepting $H_{A1}$, which states that there is significant effect of the collective factors on the achievement of gender equity and equality in Information Technology. This is of course true considering that $X_1$, $X_2$, $X_3$, $X_4$ and $X_5$ are factors affecting the achievement of gender equity and equality in Information Technology and considering our earlier survey of various works in previous chapter (Natasha, 2003).

**Coefficients and T-Sig. Test**

**Table 4.11 Coefficients**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>5.845</td>
<td>1.421</td>
</tr>
<tr>
<td>$X_1$</td>
<td>-0.046</td>
<td>0.071</td>
</tr>
<tr>
<td>$X_2$</td>
<td>0.172</td>
<td>0.057</td>
</tr>
<tr>
<td>$X_3$</td>
<td>0.263</td>
<td>0.054</td>
</tr>
<tr>
<td>$X_4$</td>
<td>0.057</td>
<td>0.062</td>
</tr>
<tr>
<td>$X_5$</td>
<td>0.254</td>
<td>0.061</td>
</tr>
</tbody>
</table>

Source: Researcher’s Computation 2015 (SPSS version 17)

Table 4.11, showed the unstandardized Beta coefficients that present the contributions of each variables to the model. The t and P-values showed the impact of the independent variables on the dependent variables. The decision rule is to consider individual factors with t-sig. value less than 0.05. Thus, $x_1$ and $x_4$ are the factors that do not have significant effect on the achievement of gender equity and equality in Information Technology when considered individually.

**T-test**

From table 4.11 above, it can be deduced that $X_3$ (Technophobia and Poor Motivation) and $X_5$ (Bias and Marginalization) are more significant factors affecting the achievement of gender equity and equality in Information Technology. This is because they both have significant values of 0.00. However, $X_1$ (Poor IT Career Counseling) and $X_4$ (Nature of the Field) are not considered significant when considered individually since their values are 0.513 and 0.359.
respectively and these values are greater than 0.05. X₂ (Male Dominance) is also significant since it has a value of 0.003. The conclusion drawn here is that although five factors affect the achievement of gender equity and equality in Information Technology, the main impact is as a result of X₃, X₅ and X₂.

**Regression Model and Interpretation**

**Standardized Coefficients (Beta)**

These values are used to generate the model. From the table 4.11, we have

With the above Table 4.11, the model can be generated as:

\[ Y = -0.037X₁ + 0.198X₂ + 0.305X₃ + 0.064X₄ + 0.264X₅ + 2.72044 \]  

Where:

\[ Y = \text{Gender Equity and Equality in Information Technology} \]

\[ X₁ = \text{Poor IT Career Counseling} \]

\[ X₂ = \text{Male Dominance} \]

\[ X₃ = \text{Technophobia and Poor Motivation} \]

\[ X₄ = \text{Nature of the Field} \]

\[ X₅ = \text{Bias and Marginalization} \]

That is:

Gender Equity and Equality in Information Technology = -0.037 (Poor IT Career Counseling)+0.198 (Male Dominance) + 0.305 (Technophobia and Poor Motivation)+ 0.064 (Nature of the Field)+ 0.264 (Bias and Marginalization)+2.72044.

**Test of Hypothesis**

**Test of first hypothesis:**

\( H₀₁: \text{There is no significant effect of the collective factors on the achievement of gender equity and equality in Information Technology.} \)

\( H₁₁: \text{There is significant effect of the collective factors on the achievement of gender equity and equality in Information Technology.} \)
Since F-test and ANOVA show significant F change of 0.000, we reject Ho1 and accept Ha1 which states that there is significant effect of the collective factors on the achievement of gender equity and equality in Information Technology.

**Test of second hypothesis:**

Ho2: There is no significant effect of each factor on the achievement of gender equity and equality in Information Technology.

Ha2: There is significant effect of each factor on the achievement of gender equity and equality in Information Technology.

From the t-test (see appendix), we conclude that all other individual factors have significant effects on the achievement of gender equity and equality in Information Technology except X1 (poor IT career counseling) that has a t-sign figure of 0.513 and X4 (nature of the field) with a t-sign figure of 0.359 which is greater than 0.05. Thus for X1, we accept the null hypothesis which states that there is no significant effect of poor IT career counseling on the achievement of gender equity and equality in Information Technology. Also for X4, we accept the null hypothesis which states that there is no significant effect of nature of the field on the achievement of gender equity and equality in Information Technology. However, for other factors, we reject the null hypothesis and accept alternative hypothesis.

**Summarily, the accepted hypotheses were:**

Ha2-2: There is significant effect of male dominance on the achievement of gender equity and equality in Information Technology.

The above result is true as it was observed from this research that the IT sector is characterized with Male dominance. This is in agreement with the findings of Edwina,(2005), who stated that “Men still hold most of the management and control positions in telecommunication companies and regulatory or policy-making bodies; regulatory decisions are made without any impact analysis; service licenses are attributed to companies without equal opportunity policies and controlled mostly by men”. “Few women are employed as programmers and systems analysts. Women make up a small percentage of managerial, maintenance and design personnel in networks, operating systems and software.”

Male dominance of course affects the achievement of gender equity and equality in Information Technology as it has been observed that females will seldom venture into a field which is mostly dominated by males even if they have the opportunity. “The more male the field, the more women are likely to leave” (Jenny, 2012).

Ha2-3: There is significant effect of technophobia and poor motivation on the achievement of gender equity and equality in Information Technology.
It was observed from this research that females naturally tend to have fear for technological, tedious and tasking jobs. They often view technological related courses as “male courses” and therefore not fitting for a girl because they believe that there are necessary attributes/skills needed to be successful in IT which they do not possess. This is in agreement with the opinion of Angela Bielefeldtin Jenny, (2012) who stated that “Women tend to leave engineering with higher grade point averages than the men… but they perceive that their technical skills are sometimes different. And they’re not different, in reality” (Jenny, 2012).

Poor motivation and lack of mentors also keep females away from the Information Technology sector. Eileen, 2013 supports this by saying that “The most powerful determinant of whether a woman goes on in science might be whether anyone encourages her to go on.” It is also in line with the view of Wilasinee & Jarupa, (2010), which opined that “In science and engineering, women lack mentors to help them along”. Lack of mentors adversely affects women’s participation in Information Technology because “people with mentors receive more promotions and higher compensation, and tend to have higher job satisfaction and career commitment than those without such advisors as opined by Catherine and Sarah, (2009).

H_{02.5}: There is significant effect of bias and marginalization on the achievement of gender equity and equality in Information Technology.

The result above suggests that even when women take up career opportunities in Information Technology, they are still treated unequally because of their gender. This is in total agreement with the findings of Jenny, 2012 who opined that “Women software developers earn 80% of what men do”. Also the Salary gap between men and women in the Computer Hardware industry is 10.15%; in Computer software industry it is 10.93%; while In the Telecommunications industry it is 9.44 % (Catherine & Sarah, 2009).

H_{02.1}: There is no significant effect of Poor IT career counseling on the achievement of gender equity and equality in Information Technology.

H_{02.4}: There is no significant effect of nature of the field on the achievement of gender equity and equality in Information Technology.

**Ranking of the Factors**

The order of ranking using beta shows the actual level of impact or contribution to any change in independent variables. Using the beta coefficient, we have the ranking as:

1\textsuperscript{st} = X_3: Technophobia and Poor Motivation

2\textsuperscript{nd} = X_5: Bias and Marginalization

3\textsuperscript{rd} = X_2: Male Dominance

4\textsuperscript{th} = X_4: Nature of the Field
5th = X1: Poor IT Career Counseling

SUMMARY, RECOMMENDATIONS AND CONCLUSION

Summary

The research investigated the factors impeding the achievement of gender equality and equity in Information Technology. The results arrived at show that the factors affect the achievement of gender equality and equity in Information Technology in order of ranking.

1st = X3: Technophobia and Poor Motivation
2nd = X5: Bias and Marginalization
3rd = X2: Male Dominance
4th = X4: Nature of the Field
5th = X1: Poor IT Career Counseling

Recommendations

Based on the top ranked factors discovered to impede the achievement of gender equality and equity in Information Technology, we can say that motivation will play an indispensable role. There is great need to motivate females into taking up career jobs in Information Technology and indeed all other tech-based jobs and engineering.

There is need to ensure equal treatment of women in terms of job opportunities, celebration of achievements, promotions etc. In line with this, individuals should be treated on the basis of their technical skill and knowledge and not on the basis of their gender.

It is also recommended that women must learn to cultivate confidence in their abilities to perform exceeding well even in a male dominated sector. To achieve this, women must understand that the Information Technology sector offers them a unique platform to demonstrate their knowledge and capabilities. They must bear in mind the fact that they can bring new perspectives to problems that men have trouble solving.

Recommended also is the need for females to live in the awareness that technical skills are not gender-oriented as there are no technical skills or Information Technology knowledge set apart for a particular gender. Everyone can acquire and effectively utilize these skills, irrespective of their gender.

Government regulatory agencies like (NCC, CPN etc), should be gender sensitive while enacting policies that ensure gender equity and equality. This will encourage the female folks to take up career in Information Technology and other Computing related fields.

Women interest groups in Information Technology (like NIWIIT, GSAN etc) have very indispensable roles to play. Firstly, they need to establish a very strong online presence to
enlighten and educate women especially young girls of the relevance of taking up career opportunities in Information Technology. They can actualize this by creating groups or pages on online social media platforms such as Facebook, WhatsApp, Twitter, BBM etc. They should also advocate for the rights of its members ensuring that they are not marginalized. This they can achieve by opening wide their doors, to welcome scores of young girls with bright minds, endless ambition and the desire to make their mark in the ICT fields. They also need to adequately expose these girls to innovative technology and most importantly, engage them with some of our most dynamic women leaders who show them that yes — the world needs them in ICT.

Conclusion

The fact remains that women differ from men and that they differ in their capabilities as well. But the skills people poses differ on their knowledge and experience not on the basis of their gender. Gender therefore shouldn’t be a yardstick for measuring our skill and how we are treated; rather our skill level should determine how we are treated.

When the females are not fully represented in Technology, then we are cutting out half of the population. When we cut out essentially half of the population, then we are going to have a lot of creative ideas that never make their way into technology market because of the absence of the people who should have been involved in it. This then means that we will lose the female perspective. And losing that female perspective translates to the technology we are not seeing in the market. A lack of diverse perspectives also means that those inventing the technology do not reflect the customer base and this is especially the case when women are absent. Therefore, it is indeed time to start thinking about what turns women on Information Technology rather than only finding out what turns them off.

Finally, it is vital to note that if gender equality is a goal of the world society, it requires an urgent attention of every ICT policy maker and user to construct gender sensitivity towards ICTs development. This will help to ensure that ICTs will become a powerful vehicle to shape the digital future and eventually lead to the achievement of gender equity and equality in information technology.

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